

In re Patent Application of:
ARENA ET AL.
Serial No. 09/929,833
Filed: **AUGUST 14, 2001**

REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application, and for identifying allowable subject matter in Claims 35, 36, 37, and 45. New Claims 50-65 have been added.

Independent claim 50 is based on the allowable subject matter of Claim 35, and independent Claim 58 is based on the allowable subject matter of Claim 36.

In view of the arguments presented in detail below, it is submitted that all of the claims are patentable.

I. Claims 20-41 and 46-49 Are Patentable

Independent Claim 20 is directed to a system for the analysis of an image of a DNA microarray including an array of spots. The system includes a sensor for acquiring signals corresponding to the image of the DNA microarray, and a cellular neural network (CNN) circuit to process the signals from the sensor.

Similarly, independent Claim 46 is directed to a method for analyzing an image of a DNA microarray. The method includes acquiring at least one signal corresponding to the image of the DNA microarray, and processing the at least one signal using a cellular neural network (CNN).

The Examiner rejected Claims 20 and 46 as unpatentable over the Shams et al. '781 patent in view of the Chua et al. '670 patent. The Shams et al. patent discloses a scanner for scanning a microarray of DNA material to produce a digital image of the DNA material. The Examiner correctly recognized that the Shams et al. patent fails to disclose a

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cellular neural network as the processor for the DNA material image, but cites the Chua et al. patent as disclosing a cellular neural network for processing the digital image data produced by the sensor of the Shams et al. patent.

The Shams et al. patent discloses "a digital image processing-based system" (Abstract) and "an array-scanning step 208 that is performed in which the array is scanned and a gray-scale digital image of the microarray slide is produced" (column 8, lines 43-45). In addition, the Shams et al. patent discloses that "computer 401 may be implemented as any type of processor or processors that is capable of processing the digital image" (column 9, lines 45-50). In other words, the Shams et al. system can only process a digital image.

In contrast, the Chua et al. patent discloses the following:

"Cellular neural networks and Hopfield's neural networks are both analog systems. The interactions of cells in an analog system depend on the connections among the cells. Analog systems have no timing clock and work asynchronously. Cellular automata machines are digital systems and are fundamentally different from analog systems." (column 1, lines 66 to column 2, line 6).

In other words, the cellular neural network of the Chua et al. patent is an analog system, which is fundamentally different from a digital system such as the Shams et al. system. Accordingly, there is no motivation to combine the cited references because the Shams et al. patent teaches the processing of digital images and the Chua et al. system teaches the processing of analog images.

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Consequently, it is respectfully submitted that the Examiner is using impermissible hindsight, gleaned from the Applicants' own specification, as motivation to selectively combine disjoint pieces of the prior art to produce the claimed invention. There is simply no proper motivation in the prior art to selectively combine bits and pieces from the two cited prior art references.

Accordingly, independent Claims 20 and 46 are patentable. Their dependent claims, which recite yet further distinguishing features, are also patentable over the prior art and require no further discussion herein.

II. Claims 42-45 Are Patentable

Independent Claim 42 is directed to a system for the analysis of an image of a DNA microarray. The system includes a sensor for acquiring analog signals corresponding to the image of the DNA microarray, and a cellular neural network circuit for parallel processing the analog signals from the sensor.

The Examiner rejected Claim 42 as unpatentable over the Shams et al. '781 patent in view of the Chua et al. '670 patent. The Shams et al. patent discloses a system for scanning DNA material to produce a digital image of the DNA material. The Examiner has mischaracterized the disclosure of the Shams et al. patent at column 9, lines 13-16 in the Office Action. The correct and full quote is, "once the arrayer 408 places the spots to generate the microarray slide 412, the scanner 406 scans the microarray slide 412 and produces a

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digital image of the microarray slide 408 at its output 408."
(Emphasis added).

The Examiner has also mischaracterized the Shams et al. patent at column 9, lines 30-40. The correct and full quote is as follows:

"Once the digital image of the microarray is output by the scanner 406, the image processing computer 401 processes the digital image 414. The image processing computer 401 is preferably electrically connected at its input port 402 to the output port of the scanner 406. The digital image 414 of the microarray slide 412 is then processed by the image processing computer 401. At the output 404 of the computer 401, the image analysis data 416 that is used to perform the gene expression analysis in the next microarray process step 216 is provided. This data generally includes measurements of the attributes that characterize the gene expression signal of each spot in the microarray." (Emphasis added).

As argued above, the cellular neural network of the Chua et al. patent is an analog image processing system, in contrast to the digital image processing of the Shams et al. system.

Accordingly, there is no motivation to combine the Shams et al. patent and the Chua et al. patent. The Examiner is once again using impermissible hindsight, gleaned from the Applicants' own specification, as motivation to selectively combine disjoint pieces of the prior art to produce the claimed invention and therefore independent Claim 42 is patentable. The dependent claims, which recite yet further

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distinguishing features, are also patentable over the prior art and require no further discussion herein.

III. Copies Of Papers Originally Filed

Enclosed is an accurate and complete copy of the originally submitted documents. Please make the enclosed copy of the originally submitted documents a part of the permanent record.

CONCLUSIONS

In view of the arguments presented above, and the Examiner's indication of allowable subject matter, it is submitted that all of the claims are patentable. Accordingly, a Notice of Allowance is respectfully requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned at the telephone number listed below.

Respectfully submitted,



DOUGLAS J. VISNIUS
Reg. No. 48,012
Allen, Dyer, Doppelt, Milbrath
& Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
407-841-2343 fax
Agent for Applicants

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 19th day of November, 2004.



A handwritten signature in black ink, appearing to read "Justin D. Owen", written over a horizontal line.

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Amendments to the Drawings:

Replacement sheets 1-5 are submitted to replace original drawings sheets 1-5. Original drawing sheets 1-5 included Figs. 1-12 and the replacement sheets include replacement Figs. 1-12. The replacement sheets include amendments to Figs. 2 and 7 that provide suitable legends for each amended figure as requested by the Examiner.

Attachment: Replacement Sheets